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Signed Andrew Gerry

Dated 23 September 1999

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equest for grant of a patent

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1. Your reference — MTW 50667

2. Patent application number *(The Patent Office will fill in this part)* — 04 SEP 1998 — 9819196.8

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

IMPERIAL CHEMICAL INDUSTRIES PLC
IMPERIAL CHEMICAL HOUSE
MILLBANK, LONDON SW1P 3JF
UNITED KINGDOM

Patents ADP number *(if you know it)* — 935003

If the applicant is a corporate body, give the country/state of its incorporation — UNITED KINGDOM

4. Title of the invention

EDGE-LIT ILLUMINATION SYSTEM

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

SARA HILLARY MARGARET GIBSON
ICI Group Intellectual Property Department
PO Box 90, Wilton, Middlesbrough
Cleveland TS90 8JE
United Kingdom

7248594001

Patents ADP number *(if you know it)*

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

Yes

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Continuation sheets of this form	
Description	3
Claim(s)	
Abstract	
Drawing(s)	1

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

IMPERIAL CHEMICAL INDUSTRIES PLC
Signature S H M Gibson Date 3 September 1998

12. Name and daytime telephone number of person to contact in the United Kingdom

SARA HILLARY MARGARET GIBSON
(01642) 436282

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Edge-Lit Illumination System

The present invention relates to an edge-lit illumination system

Edge-lit illumination systems which have as a basic feature a light source positioned alongside an edge of a light transmitting sheet are well known. The state of the art is typified by the light transmitting sheet being treated on at least one of its surfaces such that the light entering the edge of this sheet is irregularly reflected or scattered. Therefore this light is spread evenly across the illuminated surface. One of the ways of treating the surface is by application of a matrix of light reflecting and scattering material either directly to the surface or to a transparent film which is then adhered to the surface as disclosed in EP- A- 0549679. In this application the light reflecting material is in the form of dots which may be etched, painted or screen printed directly on to the surface of the light transmitting sheet or that of the transparent film adhered to the surface. The density of these dots may be increased in the direction away from the edge at which the light source is fixed by increasing the number of dots per unit area and decreasing the gaps between them or by keeping the gaps between the dots the same and increasing the size of the dots.

One disadvantage of the above system is that if this dot pattern across the light transmitting sheet is disturbed or disrupted in some way then correspondingly visually the illumination of the system appears to be disturbed. For example if there was some abrasion or staining of a screen etched dot pattern then visually the illumination would appear to be disrupted corresponding to where the abrasion or staining had occurred on the light transmitting sheet.

It is an object of the present invention to provide a novel surface treatment for the light transmitting sheet such that when this treatment is disturbed or disrupted there is some reduction in the visual disruption to the illumination of the system.

Accordingly the present invention provides an edge-lit illumination system comprising a light transmitting sheet and a light source; the light source being positioned in proximity to and adjacent to an edge of said light transmitting sheet, characterised in that at least one of the two opposing surfaces of said light transmitting sheet carries markings such that said markings are disposed randomly within each of at least one nominal area of said at least one surface.

The light transmitting sheet is a transparent material. By transparent we mean capable of transmitting rays of light without diffusion. It may be glass or plastic but is preferably plastic and more specifically a clear acrylic sheet.

Many types of light source are available but preferably fluorescent tubing is used. The diameter of the fluorescent tube may vary from typically 6mm, commonly referred to as T2, to 25mm, T8. The distance from the edge of the light transmitting panel to the crest of the tube is preferably between 1 and 2mm. Preferably the fluorescent tube is an aperture tube. This type of tube has coated on the inside wall of the glass a reflective coating with a fluorescent coating on top of it. The aperture tube opening is a part of this tube, for example 30° of the 360° around the inside of the tube, with no coating. This opening runs the length of the tube and is arranged so it is directing light from the light source at the edge of the light transmitting sheet. A reflector is typically positioned behind each fluorescent tube and may be any material capable of reflecting light, for example mirrored aluminium. Preferably the light transmitting sheet is in a fixed relationship to the light source.

The surface of at least one side of the light transmitting sheet is substantially covered in markings which are disposed randomly within each of a at least one nominal area of this surface. Preferably both opposing surfaces of this sheet are so covered. Each nominal area may be of an equal size or there may be a variety of nominal areas chosen for the surface of the light transmitting sheet. The sheet may be a single nominal area. An example of a nominal area is an area which is the length of the side of the surface of the light transmitting sheet adjacent to the light source in combination with a width of for example 10, 25 or 50mm.

The level of ink coverage is preferably 0.1 to 99%, more preferably 3 to 40% and especially 5 to 30% for the random markings within each nominal area. The markings may be of any shape, for example square, round, rectangular, triangular or irregular. Preferably they are of an irregular shape, for example irregularly shaped generally elongated structures based on squares and/or rectangles. The markings may be of equal size or a variety of sizes preferably ranging from 0.1mm to 10mm in length, more preferably 0.3 to 3mm. The percentage of coverage of the markings on the surface of the light transmitting sheet may remain the same for each nominal area across the sheet . However preferably the density of markings is increased in a direction away from the edge of the light transmitting sheet at which the light source is positioned. The density of markings can be increased by increasing the size of the markings and/or the number of markings for each nominal area. The markings can be translucent or opaque and ar preferably light coloured. By translucent we mean capable of transmitting rays of light with diffusion also. By opaque we mean substantially incapabl of transmitting light.

These markings may be etched, painted or screen printed directly on to the surface of the light transmitting sheet or to that of a transparent film which is itself then adhered to the surface. Preferably the markings are screen printed directly on to the surface of the light transmitting sheet. An example of screen printing is stochastic screen printing. One simple way of defining stochastic screen printing is to compare it with the screen printing of the dot matrix as described in EP- A- 0549679. For a chosen nominal area of the dot matrix in EP-A-0549679 there is an associated coverage of ink on the light transmitting sheet. For the stochastic screen printing each dot in this ink coverage is broken down, using a computer programme, into many smaller markings (these smaller markings are the markings of the present application). These smaller markings are randomly distributed in a pattern in the designated nominal area. They may be of equal size or a variety of sizes. This is as disclosed in Screen Process, July 1995, page 14 by J Mulvey.

The overall illumination achieved may be similar or greater than that achieved when the dot matrix is as described in EP- A- 0549679.

Edge-lit illumination systems described in the present invention can be used as lighting devices or light sources as well as advertising displays and also may be modified for use as illuminated shelving, for example in refrigerators.

Specific embodiments of the invention will now be further described in the following examples and with reference to the accompanying drawing (Figure 1) which is a sectional view through an illuminated display system according to the invention and Figure 2 which is an embodiment of the random markings pattern on one surface of the light transmitting sheet.

Example 1

In Figure 1 the light transmitting sheet (10) is a 420 x 610 x 10mm clear cast polymethylmethacrylate (PMMA) which has been treated by screen printing white markings directly on to both its opposing surfaces (11,12). The markings are printed on to each surface as shown in Figure 2 and range from 0.3 to 3mm in length. The light sources are Sylvania Luxline Plus Daylight Delux fluorescent tubes (13,14) which both have a power output of 18 Watts, a colour rendering value (Ra) of 86 ,a colour temperature of 6500 Kelvin and a diameter of 25mm. These are each placed adjacent to an edge of the light transmitting sheet and surrounded by a mirrored aluminium reflector (15,16).

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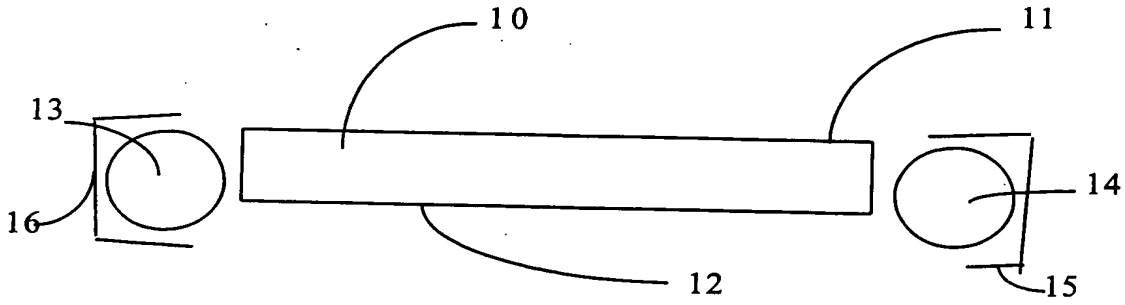

Figure 1

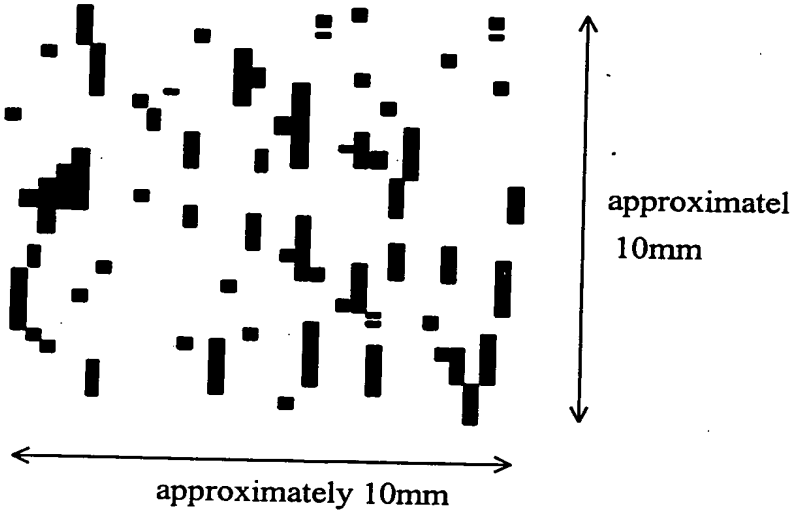

Figure 2

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